Math Bench Assessment

Josephine Tam

Y10 Hope

Victoria Shanghai Academy

Introduction and the research of the bench

In the first math assessment, we are going to make a bench. The reason that I am going to make a bench, because my grandma is almost birthday. My grandma lives in America, and she has a big garden in front of her house, she needs a bench for the decoration of her garden. I was asked for making a bench as a birthday present to my grandma. And this is the reason, that I make a bench.

Figure 1: An example of my design of bench

I design to make a curve teak bench with back. "The Spirit Song benches use a patented design to achieve durability and comfort using artistically curved elements." The curve line of the bench. It comfortable for people sitting on. The style of the bench will be shoulder to shoulder. This bench will mostly make from tropical hardwoods, and stainless-steel fittings make this bench maintenance free. This bench can use in garden, also can use in the public park or as furniture. The material that I need for this bench is wood.

The measurement of my bench. The length of the bench would be 69cm. And the depth of the seat of the bench would be about 32cm. The Height of the bench will be around 33cm. The back of my bench is around 16.5cm.[1]

[1] The Quote "The Spirit Song benches use a patented design to achieve durability and comfort using artistically curved elements.", from http://www.diamondteak.com/bcwb.html

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Research on Function Transformation Equation

We compare the functions with equation y = f(x) and y = f(x-3). To realize what this means, we can take an example:

$y = 3x^2 + 4x + 5$ and

$y = 3(x-3)^2 + 4(x-3) + 5$

The two graphs are parabolas.

The image of a by the first function is

$3.a^2 + 4.a + 5$

If we want the same image for the second function, we have to replace x by a+3. Then we have the image

$3.((a+3)-3)^2 + 4.((a+3)-3) + 5 = 3.a^2 + 4.a + 5$

Generalizing: the image of x by the first function is the same as the image of x+3 by the second function.

If we write the first function as f(x), then the second function is f(x-3). This means that the graph of y=f(x-3) arises when we move the graph of y = f(x) three units to the right.[2]

Table 1: Chart of Transformation Equation

[1]y=x^2 y=2x^2 y=3x^2 y=0.5x^2 y=0.3^2	y=x^2 y=(x+1)^2 y=(x+2)^2 y=(x+3)^2 y=(x-1)^2 y=(x-2)^2	y=x^2 y=x^2+1 y=x^2+2 y=x^2-1 y=x^2-2

[2] Research on Function Transformation Equation quote from http://home.scarlet.be/math/transfunctie.htm

The first group of Transformation Equation tried in Geogebra

In the math lesson, we were told to draw a bench, and then use the numbers below try to make a graph, and found out the different or the changes.

The first group number that given, are the numbers form big to small. When I tried out the equations on the function. I found out that, the biggest number it had, the curve line will be smallest, however the smallest number got the biggest curve line. The lines in the first graph, all are start in the same points. And this graph is stretched horizontally. How the curve line shift in different column, is reflecting by along the y-axis, y=f(-x). The graph of y=f(x) enlarge about double time along the x-axis, the function represented by the images is y=f($\frac{1}{mx}$).

Screen Shot 1:

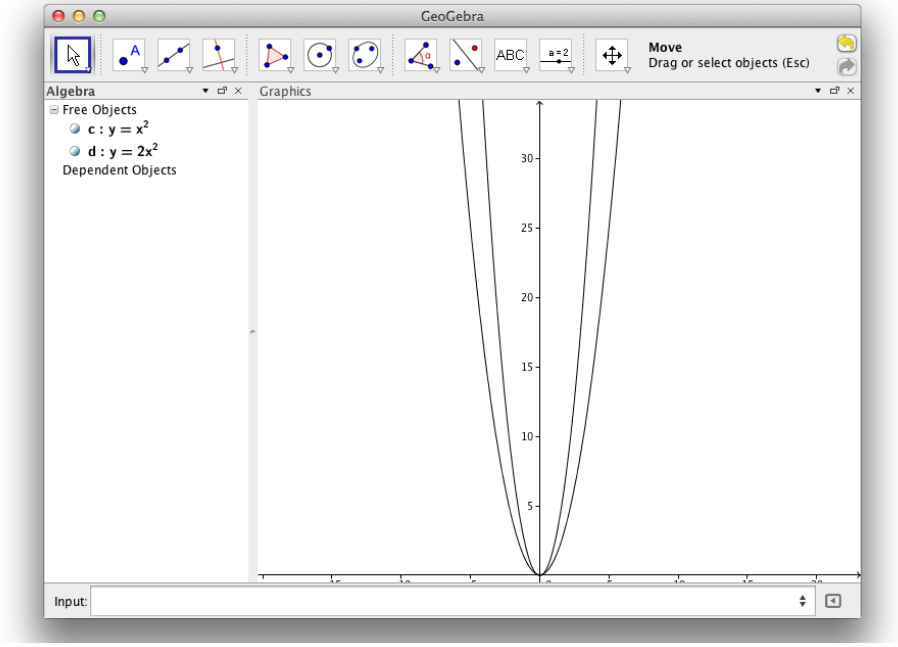


Figure 2: This is the graph from Geogebra, it shows the curve line of first two equation.

Screen Shot 2:

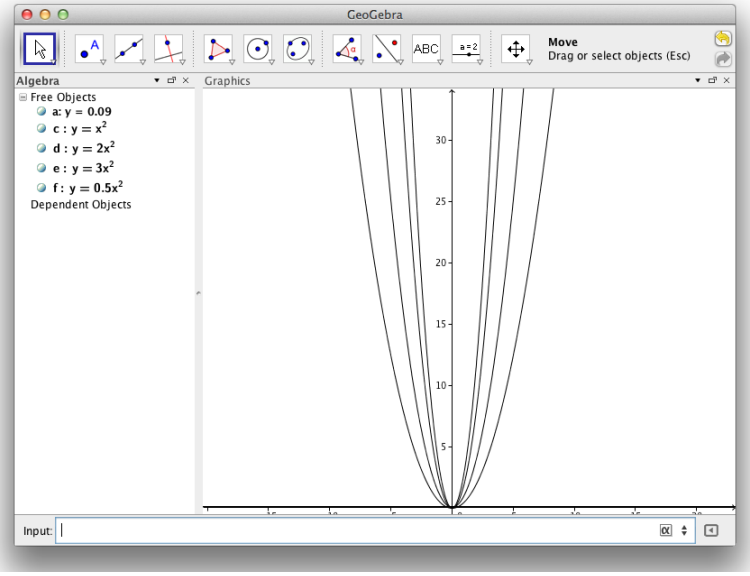


Figure 3: This is the second graph from Geogebra, It include the remain equation of the first group Transformation Equation.

The second group of Transformation Equation

Using the second group of number or equation, to make a graph. The first graph compare to second graph are totally different. The curve lines on the second graph are in different place. Compare to the first graph, the curve lines are mainly in the center. Also, the line of second graph, all start in 0 on y-axis, in other hand start with different points in the x-axis. I found out the numbers of equations are different, but the size of the curve line is same. These are the changes of the second graph. Is stretched horizontal. And it shift left of 5 column.

Screen Shot 3:

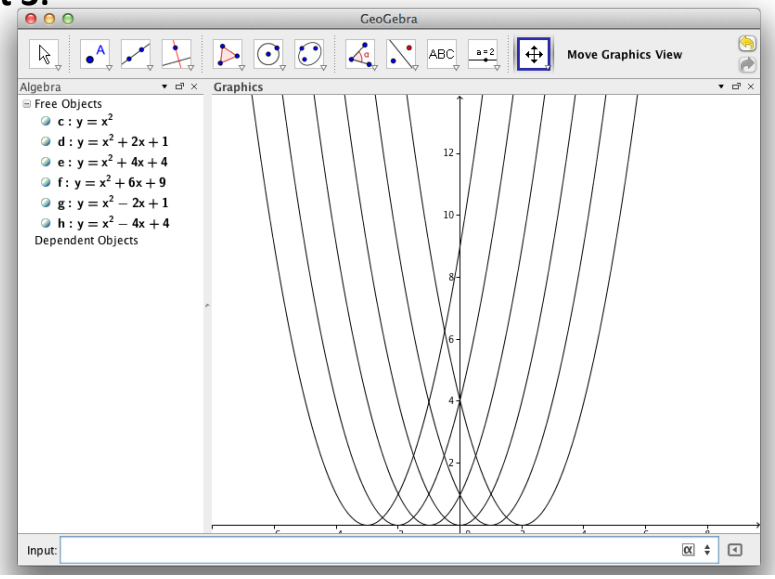


Figure 4: This is the third graph, and is the first three equation of second group number.

Screen Shot 4:

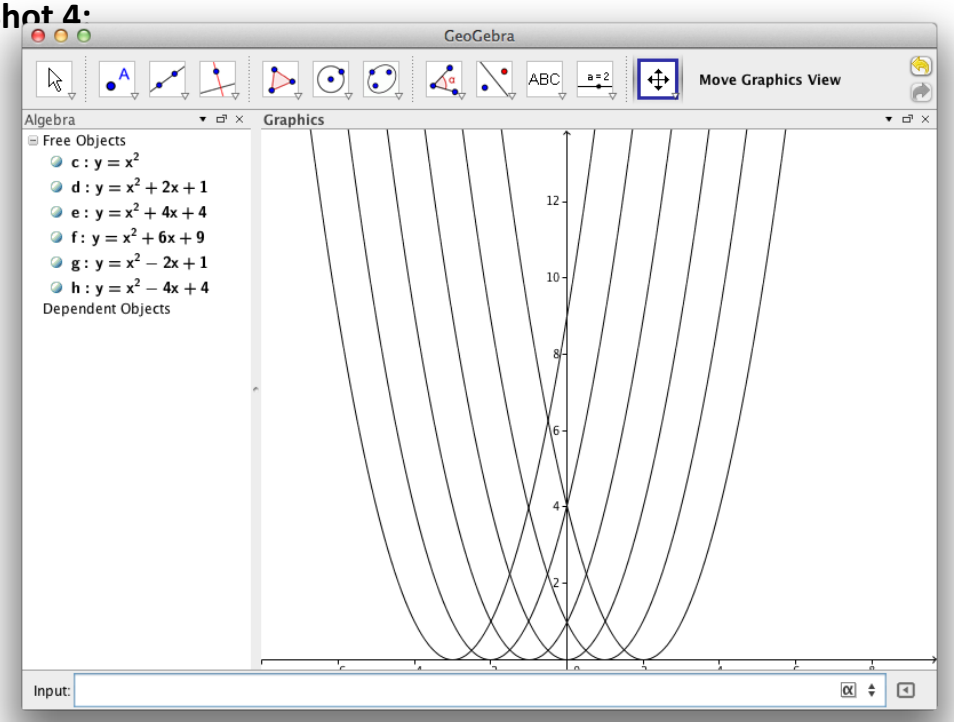


Figure 5: This is the forth graph, and it shows the last three equations that I tried.

The Third Group of Transformation Equation

Of the third graph, compare to the first and second graph. They are totally different. The numbers are not starting in the same point. However, there also got a similarity, the equations of the third graph also are mainly in the center, same as the first graph. And the second graph changes, is on the x –axis, but the third graph, changes is in the y-axis. The way that the curve line are reflection along the x-axis, the equation is use by y=-f(x). The curve line are all stay at the point of 0.

Screen Shot 5:

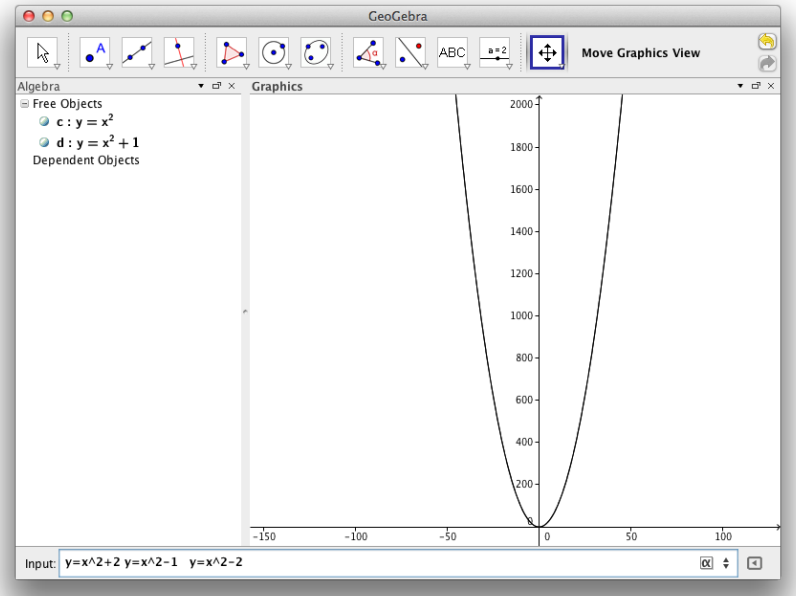


Figure 6: This is the fifth graph, and the first two equations.

Screen Shot 6:

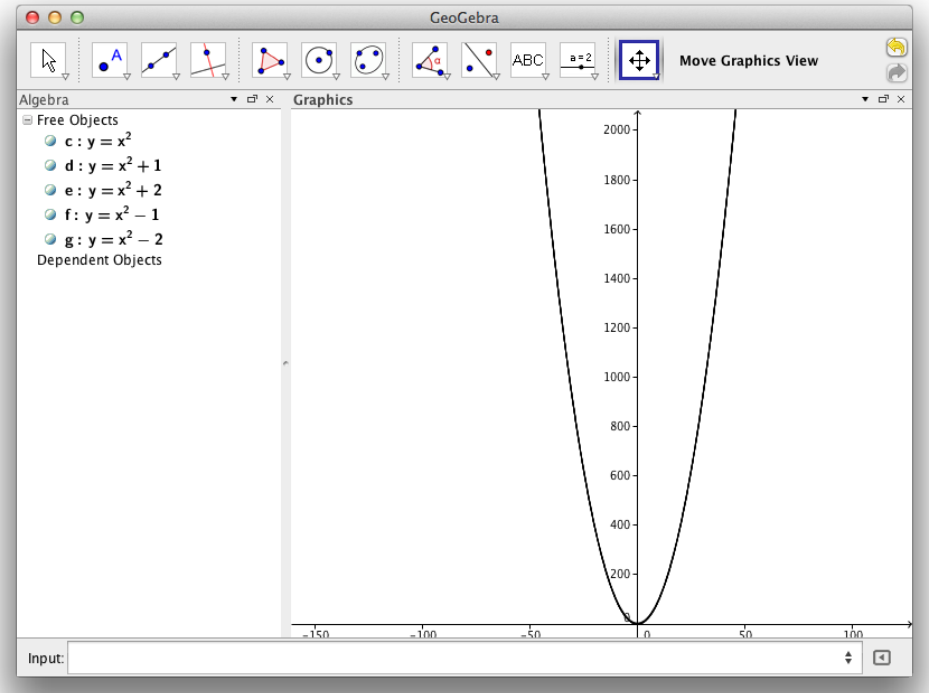
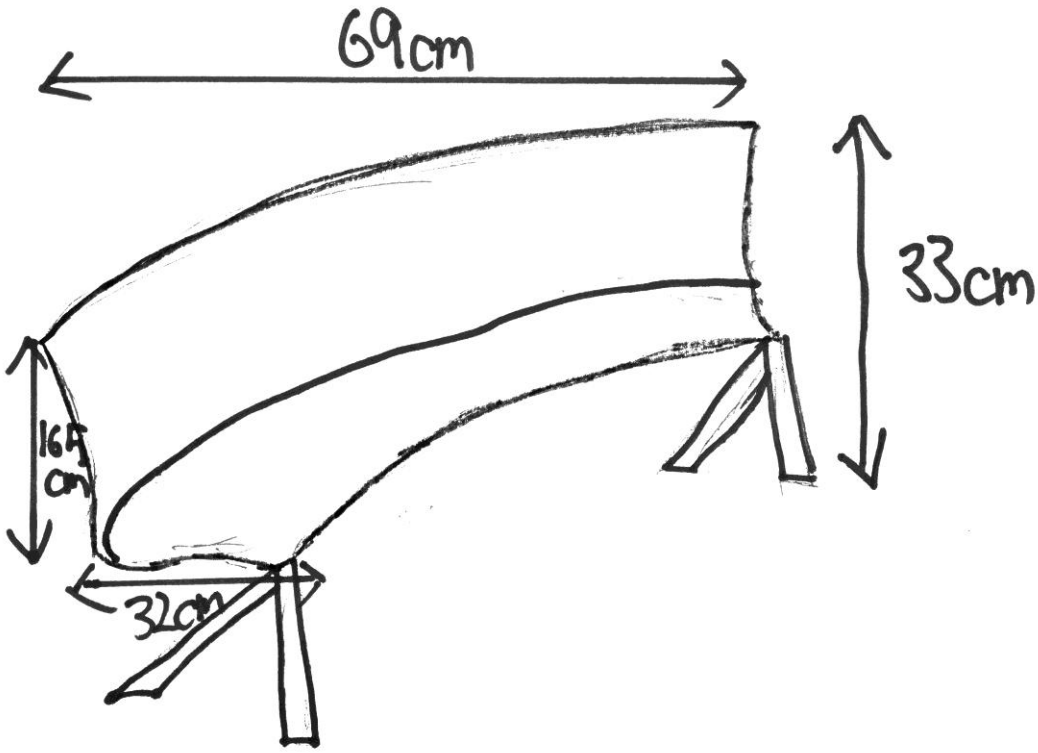


Figure 7: This is the sixth graph, is the last three equation of the curve line.

Mv Sketch of the curve teak bench with back bench



Length	69cm
Depth	32cm
Height	33cm
Length of the back	16.5cm

The Table of the measurement

The final bench draft

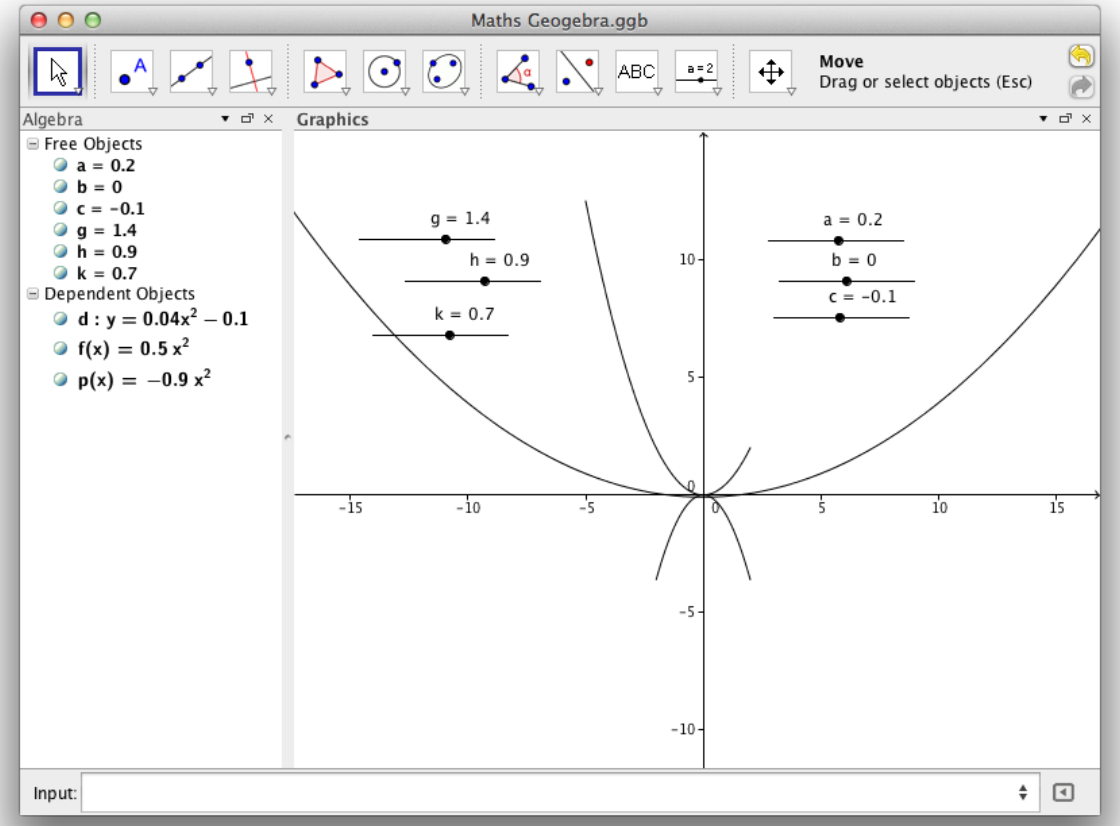


Figure 8: the function graph of final product

Above, is the graph that I use Geogebra software to make an image of my bench, in this graph; I had use many equation to make a bench. The equation of "function [<function>, <start x-value>, <end x-value>]" and "y = a (x - b)² + c ". These equations can help to cut the curve line to the length that we want on the bench, also can stretch the curve line upside down, and move around to the left or right. The length of my bench seat, is using the function of x^2. The bench leg, curve line is using the equation of 0.5x^2. However, when I chose to move around the curve line, stretch it vertically, the equation turns it in to -0.9x. And the back seat, original equation is x^2, now it change it into 0.04x^2-0.1, the reason why it changes, because I move the curve line around. And the other numbers are the equation of object, to move the line around.

In this assessment, I found the most difficult is to using the software Geogebra. This software is hard to use, the explanation of how to use Geogebra, is also a bit hard for me to understand. It

confused me when I was using it, I don't know what function can I use in Geogebra. I think it could be easier, if we use another software to make the graph.

Reflection

After checking my grade of math bench assessment, I'm proud of my grade; because I'm never have 5 grade marks before. However, I also got something to improve on, if I have to get a 6.

The first things that I have to improve, is to the description of the graph. I should be describing more on how the curve line stretch, vertical or horizontal. And I should study more the vocabulary on the math words, then I can use it in the description. There also have one more thing that I have to improve. The research of Function Translation Equation, I shall research more on the details. Then I can understand or learn more from the information that I researched.

The second thing that I have to improve on is to write the each description of each function in my final design of bench.

If I have a chance to do it again, I wont make it a big different between the bench of my design and the Geogebra one. The formula that I use in my bench, was mainly the equation of x^2. And the reason why I use x^2 instead of using the 3x^2 or 0.5x^2. It because when the number of ^2 get much, the curve line will be thinner. In the other hand, when the range of number get less, the curve line will get bigger, and it is not fit with a bench.

I think my design of bench can't use it in a real life, firstly the measurement of my first draft of bench, it can use it in the real life. After making the bench in Geogebra, found out the measurement had a big different, didn't get what I expect, the measurement are not long enough to make a bench in real life.

In conclude, the software of Geogebra is difficult to me to use. And I really didn't write many details on the description, and use more practical words.

Percentage Errors

	My draft of bench	Geogebra
Length	69cm	7.35cm
Depth	32cm	7.12cm
Height	33cm	16.03cm
Length of the back	16.5cm	12.62cm

Figure 9: Tabel of bench measurement between Geogebra and my draft

	My draft of bench	Geogebra	Perentage Errors
Length	69cm	7.35cm	$\frac{7.35-69}{69}$x100%=6.35%
Depth	32cm	7.12cm	$\frac{7.12-32}{32}$x100%=6.12%
Height	33cm	16.03cm	$\frac{16.03-33}{33}$x100%=15.03%
Length of the back	16.5cm	12.62cm	$\frac{12.62-16.5}{16.5}$x100%=11.62%

Figure 10: The table of Percentage Errors[3]

[3] The software that I use for making my bench in graph is Geogebra.

And the Percentage Errors were all calculate by calculator.

Bibliography

1. Bench Information

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3. Geogebra

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4. Research on Function Transformation Equation

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